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Case Report

The effects of orofacial myofunctional therapy combined with an occlusal splint on signs and symptoms in a man with TMD-hypermobility: case study

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THE EFFECTS OF OROFACIAL MYOFUNCTIONAL THERAPY COMBINED WITH AN OCCLUSAL SPLINT ON SIGNS AND SYMPTOMS IN A MAN WITH TMD-HYPERMOBILITY: CASE STUDY

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ABSTRACT: Exercise therapy has been indicated for the treatment of temporomandibular disorders (TMD), but few reports are available about the effect of orofacial myofunctional therapy, which includes working with stomatognathic functions, in patients with TMD. A 49-year-old man with a diagnosis of TMD-hypermobility and orofacial myofunctional disorders received combined treatment with orofacial myofunctional therapy and an occlusal splint. Clinical evaluation and the scale of symptom severity after 9 treatment sessions and during follow-up compared to the phase before treatment suggested that treatment was of great benefit. We conclude that the combination of orofacial myofunctional therapy and an occlusal splint can be beneficial for patients with TMD-hypermobility. However, since this was a single case, further studies are needed to confirm these preliminary findings.

Keywords: temporomandibular disorder, orofacial myofunctional therapy, occlusal splint

INTRODUCTION

Exercise therapy has long been indicated for the treatment of temporomandibular disorders (TMD) (Greene, 1979; Funt, Stack & Gelb, 1985) in combination with other therapeutic modalities such as an occlusal splint (Felício, Rodrigues da Silva, Mazzetto, & Centola, 1991; Zeno, Griffin, Boyd, Oladehin & Kasser, 2001), or alone (Au & Klineberg, 1993; Martini, Martini, & Carano, 1996; Magnusson & Syren, 1999; Carlson, Bertrand, Ehrilch, Maxwell, & Burton, 2001, Nicolakis et al., 2001a;b; Nicolakis et al., 2002). Exercise therapy usually consists of passive and active movement of the mandible (Magnusson & Syren, 1999), correction of body posture, and relaxation techniques (Nicolakis et al., 2001a;b; Nicolakis et al., 2002), as well as patient education (Zeno et al., 2001; Dworkin, et al., 1994).

Patients with TMD frequently present orofacial myofunctional disorders, i.e., alterations in deglutition (Greene, 1979; Funt et al., 1985; Gelb & Bernstein, 1983; Willianson, Hall & Zwemer, 1990), mastication (Stohler & Ash, 1985; Mongini, Conserva & Tempia-Valenta, 1989; Felício, Mazzetto, & Dos Santos, 2002) and speech (Felício, et al., 1991) patterns which may or may not be the consequence of TMD, but which may aggravate or perpetuate the problem. Changes in mastication as well as in other orofacial behaviors may provoke a significant change in mechanical load on the temporomandibular joint (Hinton & Carlson, 1997).

For these reasons, orofacial myofunctional therapy (OMT), also a modality of exercise therapy whose objectives include the promotion of proprioception, tonicity and mobility, working with the facial and cervical musculature, as well as with stomatognathic functions – respiration, mastication, deglutition and speech (Schievano, Puppin-Rontani & Bérzin, 1999; Cayley, Tindall, Sampson & Butcher, 2000), has also been

suggested for patients with TMD (Greene, 1979; Funt et al., 1985; Weinberg, 1979). However, few reports on the analysis of the effect of OMT are available. It has been previously observed that treatment of patients with TMD–myofascial pain and associated myofunctional orofacial disorders with an occlusal splint in combination with myofunctional therapy yielded better results than the use of the splint alone (Felício, et al., 1991). The purpose of the present report was to describe a case of TMD with clinical signs of hypermobility treated with OMT and an occlusal splint.

CASE PRESENTATION

A 49-year-old man with a diagnosis of TMD, made by a dental specialist in orofacial and occlusal pain at the Nucleus of Occlusion and Dysfunction of the University, was referred for evaluation by a speech pathologist. The patient gave written informed consent to participate in the study. The evaluation consisted of investigation of the symptoms by means of a questionnaire. The patient was also asked to express the severity of symptoms according to specific situations, such as when waking up, during mastication, during speech and at rest, using a printed 11 point numerical scale in which zero was considered to be complete absence of a sign or symptom and 10 was considered to be the highest possible severity. The severity score of each symptom consisted of the sum of the scores attributed to each sign or symptom in the four situations mentioned above, therefore it can to vary from zero to 40 (Felício, Mazzetto, Da Silva, Bataglion, Hotta, 2006).

The patient was then submitted to examination of the orofacial structures and stomatognathic functions. The patient complained of fatigue and pain in the face and head, more intense on the right side, since his youth, which had worsened over the last two years. He stated that, because of the symptoms, he had already sought care from a general practitioner, an otorhinolaryngologist, a psychiatrist and, last, a dentist. He reported nocturnal centric and eccentric bruxism and stated that he always felt tired and with no inclination to participate in social activities. According to severity scores attributed by the patient, the worst symptom was tinnitus (score 17), followed by fatigue (13) and pain (10) in the mandible elevator muscles, pain in the temporomandibular joints (TMJ) (9), and cervical pain (1).
During clinical evaluation, the following myofunctional disorders were observed: facial asymmetry, which was more prominent on the left side, masticatory muscles tender to palpation, the lips remaining separated at rest, and reduced mobility of tongue and lips, especially towards the right side. In addition, there was incoordination of the mandibular movements to the right and deviations of the mandible to the left during speech, mastication was unilateral on the left, and deglutition was performed with notable effort of the perioral and mandible elevator muscles.

The patient wore removable partial dentures, involving the central incisors, the right lateral incisor, right and left first molars, left second molar in the upper arch, and the second left molar and second right premolar in the lower arch. The excursive measurements of the mandible were: buccal opening 67 mm, left laterality 15 mm, right laterality 9 mm, and protrusion 10 mm. Because of the complaint of tinnitus, the patient received an otorhinolaryngologic evaluation and audiologic exams for a differential diagnosis, and the presence of any hearing disease was ruled out.

Treatment Protocol

OMT treatment was initiated, after 60 days an occlusal splint was installed. The OMT treatment schedule consisted of 50 minute sessions every 15 days, including exercises. Each session included counseling about the disorder, instructions for home exercise, as well as instructions about the care needed to avoid luxation, with previous studies being used as reference (Felício, et al., 1991; Zeno et al., 2001; Magnusson & Syren, 1999; Carlson et al., 2001. Nicolakis et al., 2001a).

The purpose of OMT was to optimize the orofacial muscle function, through the development of adequate mobility of the lips

and tongue, symmetry and control of mandibular movements, enhancing the execution of stomatognathic functions in a manner compatible with the occlusal condition. The specific goals were: relieving the pain, stimulating the lubrication of the TMJ, reducing the tension of the mandible elevator muscles, establishing adequate mandibular posture and tongue mobility, and reducing the amplitude of mandibular movements.

The first technique focused on the relaxation of the shoulders and neck (Felício, et al., 1991). Thermotherapy with hot and moist compresses was applied to the jaw muscles and to the shoulder and neck muscles, including the trapezius and sternocleidomastoid muscles, for 20 minutes. Circular massage was then applied to the same muscle groups. To relax the elevator muscles, the patient was also instructed to pass the anterior and upper portion of the tongue along the region of palatine rugosity and of the alveolar papilla in a back and forth movement. The basis of this exercise is the tongue-papilla-mandibular reflex that occurs during mastication, i.e., when the tongue touches the papillae the mandible-lowering muscles are activated, while the mandible-elevating muscles are deactivated (Kawamura & Dubner, 1981). The borders of the tongue were stimulated with two toothbrushes in order to stimulate the contraction of transverse muscles. Next, in order to improve mobility, the patient was asked to protrude his tongue and to move it slowly in a lateral direction towards the left and right lip commissures, repeating this movement 10 times. During this exercise, the buccal opening was approximately 20 mm and the mandible was supported and contained with the thumb and index fingers of the patient, respectively.

Repetitive mandibular mobility exercise was used in order to increase the circulation and to move synovial fluid through the articular surfaces and to provide nutrition and remove metabolites from the articular cartilage (Zeno et al., 2001). During these exercise the opening and closing buccal movements were executed in a slow and controlled manner and the tongue remained coupled to the palate in order to establish a limit to the opening movement.

Regarding chewing, first, the patient was instructed to masticate simultaneously on both sides in order to divide the masticatory load and to avoid condylar translation in the contralateral joint that occurs during mandibular laterotrusion. He was also supposed to increase the time of mastication so that the food would be sufficiently triturated and moistened to avoid the excessive tension experienced during deglutition due to the effort involved in swallowing a poorly triturated bolus.

The speech therapist modeled each exercise. The patient demonstrated his knowledge of each exercise, and performed a sequence while being observed by the speech therapist. When performance was adequate, the patient was instructed to practice the sequence three times a day at home. Two months after the beginning of treatment, i.e., after 4 sessions, the patient reported improvement of symptoms. During this phase, the occlusal splint was installed and recommended for use at night. This is a conservative treatment with no contraindication in cases of TMD (Ash & Ramfjord, 1998; Kreiner, Betancor & Clark, 2001).

A myorelaxing splint was made and adapted to the upper arch. Periodical adjustments were made on the splint in positions of centric relation (CR), lateralities to the right and left, and protrusion, thus providing bilateral, homogeneous and simultaneous occlusal contacts in addition to canine and functional anterior guides (Okeson, 1993). From then on, the patient started to perform the exercises of mandibular mobility while wearing the occlusal splint. In addition to mouth opening and closing, he performed lateral movements to the right and to the left and protrusion with the application of light counter-resistance. A resistance was applied by the patient with the thumb in contrary direction to the jaw movement.

After the patient had developed better muscle function movements, training for alternate bilateral mastication was initiated. There were no obstacles for this training

since the patient presented occlusion guides, and absence of occlusal interference on the non-working side.

After 5 additional sessions of OMT, the patient was reevaluated. During this reevaluation the patient demonstrated adequate posture, with sealed lips and maintenance of a free functional space, symmetrical mandibular movements, and equilibrated stomatognathic functions. The patient reported comfort both at rest and during functional activities such as mastication and deglutition, with almost full remission of muscle pain and fatigue.

In terms of symptom severity, the patient still reported some mild symptoms such as tinnitus (score 2), pain in the elevator muscles and in the TMJ (2), and muscle fatigue (2). The excursive measurements of the mandible during this final phase were: mouth opening 55 mm, left laterality 9 mm, right laterality 8 mm, and protrusion 9 mm.

In view of the improvement of the general picture and of the overall condition of the patient, who reported better disposition for social activities and for work, treatment was discontinued. However, the patient was instructed to maintain the functional patterns as established during therapy. After 4 months of follow-up, there was maintenance of the excursive measurements of the mandible, and an improved severity score of symptoms such as tinnitus (score 1), TMJ pain (1), and muscle fatigue (1), whose occurrence was reported to be only sporadic.

DISCUSSION

In the case described here, the patient reported a history of symptoms of many years duration without an adequate diagnosis or intervention. The problem had become chronic.

Pain and masticatory difficulties are two of the most common complaints of patients presenting with TMD. There is evidence suggesting that both symptoms are interrelated. Previous studies have demonstrated that many TMD patients present an irregular pattern of masticatory movements with a unilateral masticatory preference (Stohler & Ash, 1985; Mongini et al., 1989).

The patient reported an ear symptom, specifically tinnitus, characterized as an acute and brief whistle. Investigations on these TMD subjects provide support for the notion that a relationship between TMD and ear symptoms does exist (Felício et al., 2002; Lam, Lawrence & Tenenbaum, 2001). However, further studies are clearly needed to elucidate the mechanism and the role of each particular anatomic structure (Morgan, Goode, Christiansen & Tiner, 1995). Furthermore, the importance of a differential diagnosis between TMD and auditory pathologies, as done in the present case, is obvious. Signs of fatigue and depression have also been associated with chronic pain conditions, among them TMD (Carlson et al, 2001).

The method of orofacial myofunctional diagnosis was the clinical one, complemented with the scale of symptom severity according to patient perception. Both the clinical exam and the scale were also used to evaluate the results of treatment.

Many researchers have investigated TMD signs and symptoms, as well as the treatment's effect, using anamnestic indexes, scales, and questionnaires (Magnusson, List & Helkimo, 1995; Henrikson, Ekberg & Nilner, 1998; Conti, De Azevedo, De Souza & Ferreira, 2001). Previous studies have demonstrated that exercise therapy is effective for the treatment of TMD both when combined with an occlusal splint (Felício, et al., 1991; Zeno et al, 2001) and when applied separately (Magnusson & Syren, 1999; Carlson et al, 2001; Nicolakis et al., 2001a;b; Nicolakis et al., 2002), in cases of myofascial pain dysfunction syndrome (Felício, et al., 1991; Magnusson & Syren, 1999; Carlson et al, 2001; Nicolakis et al., 2002), or in internal disorders of the TMJ (Zeno et al, 2001; Au & Klineberg, 1993; Martini et al, 1996; Nicolakis et al., 2001a;b).
In the present case, special attention was paid to the stomatognathic functions, beginning with the basic conditions for their performance such as control and mobility of

the tongue, lips, cheeks and mandible. The patient was also counseled and trained regarding functions such as respiration, mastication, deglutition and speech. (Funt et al., 1985; Felício, et al., 1991).

In addition, the patient received information about the disorder which included etiologic, predisposing and aggravating factors, the fundaments of the strategies for symptom control, the importance of integrating the stomatognathic functions, and the need to regularly practice the exercises and the behaviors recommended. Other studies have examined the efficacy of bio-behavioral strategies regarding the administration of the behaviors and the physiological processes associated with TMD (Carlson et al, 2001; Dworkin et al, 1994; Nicolakis et al., 2002; Michelotti, De Wijer, Steenks & Farella, 2005). Since behavioral strategies (Carlson et al, 2001) and therapeutic exercises are very cost effective both for the patient and society (Magnusson & Syren, 1999), this therapy could be recommended for patients with TMD.

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CONCLUSIONS

The results suggest that OMT associated with an occlusal splint was effective for the functional improvement of the stomatognathic system and consequently for the treatment of TMD-hypermobility. However, because this was a single case study, additional investigations are needed to verify these preliminary findings.

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APPENDIX

THERAPY PROTOCOL

Goals	Procedures
1. To instruct the patient about the TMJ and about the care needed to avoid luxation	1.1. Provide information on TMJs: etiology, symptoms, treatments. 1.2. Tell patient: Do not open the mouth widely. 1.3. Tell patient: Do not bite large/thick food pieces.
2. Pain relief and relaxation of the jaw muscles, shoulders and neck and adequate mandibular posture	2.1. The patient should apply thermotherapy with hot and moist compresses to the jaw muscles and to the shoulder and neck muscles, for 20 minutes, every day. 2.2. The patient should perform circular massage applied to the same muscle groups, 5-10 min. 2.3. The patient should pass the anterior and upper portion of the tongue along the region of palatine rugosity and of the alveolar papilla in a back and forth movement. (relaxation of the elevator muscles), 5 min, a few times a day.
3. TMJ lubrication and controlled and symmetrical mandibular mobility	3.1. Opening and closing buccal movements executed in a slow and controlled manner for 30 sec. a few times a day. The tongue should remain coupled to the palate in order to establish a limit to the opening movement. 3.2. The patient begins to perform the exercises of mandibular mobility, mouth opening and closing, lateral movements to the right and to the left and protrusion, while wearing the occlusal splint. 3.3. In addition, a light resistance is applied by the patient with the thumb in contrary direction to the jaw movement.
4. Tongue contraction and mobility	4.1. The borders of the tongue should be stimulated with two toothbrushes, 30 sec, 3 times a day. 4.2. The patient is asked to protrude his tongue and to move it slowly in a lateral direction towards the left and right lip commissures, repeating this movement 10 times. During this exercise, the buccal opening should be approximately 20 mm and the mandible supported and contained with the thumb and index fingers, of the patient.
5. Mastication 5.1. to divide the masticatory load and to avoid condylar translation 5.2 to optimize the function	5.1. The patient should be instructed to masticate simultaneously on both sides. 5.2. Training for alternate bilateral mastication should be initiated after the patient develops better muscle function movements.
6. Deglutition To reduce the muscle tension and optimize the function	6.1. The patient should be instructed to increase chewing time to improve particle reduction and lubrication of foods.